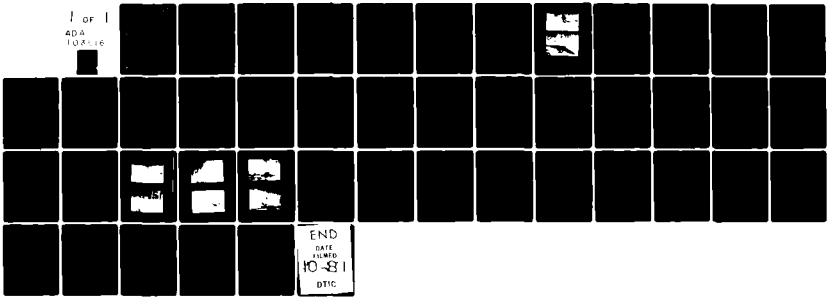
AD-A103 516 ARMY ENGINEER DISTRICT NORFOLK VA F/G 13/13
NATIONAL DAM SAFETY PROGRAM. COLLEGE LAKE DAM (INVENTORY NUMBER--ETC(U)
NOV 80 J A WALSH

UNCLASSIFIED NL

1 OF 1
ADA
103516

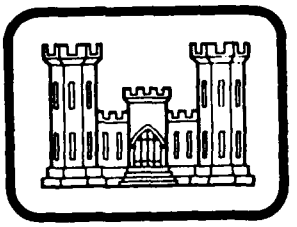


END
DATE FILMED
10-81
DTIC

JAMES RIVER BASIN

Name Of Dam: COLLEGE LAKE
Location: CITY OF LYNCHBURG, VIRGINIA
Inventory Number: VA 68002

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM



PREPARED BY
NORFOLK DISTRICT CORPS OF ENGINEERS
803 FRONT STREET
NORFOLK, VIRGINIA 23510

IN CONJUNCTION WITH

COMMONWEALTH OF VIRGINIA
STATE WATER CONTROL BOARD

NOVEMBER 1980

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A103 516	3. RECIPIENT'S CATALOG NUMBER
4. TITLE *(and Subtitle)* Phase I Inspection Report National Dam Safety Program		5. TYPE OF REPORT & PERIOD COVERED Final
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) National Dam Safety Program. College Lake Dam (Inventory Number VA-68002), James River Basin, City of Lynchburg, Virginia. Phase I Inspection Report.		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS U. S. Army Engineering District 803 Front Street Norfolk, Virginia 23510		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS		12. REPORT DATE November 1980
		13. NUMBER OF PAGES
14. MONITORING AGENCY NAME & ADDRESS *(if different from Controlling Office)*		15. SECURITY CLASS. *(of this report)* Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT *(of this Report)*

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT *(of the abstract entered in Block 20, if different from Report)*

18. SUPPLEMENTARY NOTES

Copies are obtainable from National Technical Information Service, Springfield, Virginia 22151

19. KEY WORDS *(Continue on reverse side if necessary and identify by block number)*

Dams - VA
National Dam Safety Program Phase I
Dam Safety
Dam Inspection

20. ABSTRACT *(Continue on reverse side if necessary and identify by block number)*

411

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

SECURITY CLASSIFICATION OF THIS PAGE *(When Data Entered)*

20. Abstract

Pursuant to Public Law 92-367, Phase I Inspection Reports are prepared under guidance contained in the recommended guidelines for safety inspection of dams, published by the Office of Chief of Engineers, Washington, D. C. 20314. The purpose of a Phase I Inspection is to indentify expeditiously those dams which may pose hazards to human life or property. The assessment of the general conditions of the dam is based upon available data and visual inspection. Detailed investigation and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

Based upon the field conditions at the time of the field inspection and all available engineering data, the Phase I report addresses the hydraulic, hydrologic, geologic, geotechnic, and structural aspects of the dam. The engineering techniques employed give a reasonably accurate assessment of the conditions of the dam. It should be realized that certain engineering aspects cannot be fully analyzed during a Phase I inspection. Assessment and remedial measures in the report include the requirements of additional indepth study when necessary.

Phase I reports include project information of the dam appurtenenances, all existing engineering data, operational procedures, hydraulic/hydrologic data of the watershed, dam stability, visual inspection report and an assessment including required remedial measures.

JAMES RIVER BASIN

NAME OF DAM: COLLEGE LAKE
LOCATION: CITY OF LYNCHBURG, VIRGINIA
INVENTORY NUMBER: VA 68002

PHASE I INSPECTION REPORT
NATIONAL DAM SAFETY PROGRAM

PREPARED BY
NORFOLK DISTRICT CORPS OF ENGINEERS
IN CONJUNCTION WITH
COMMONWEALTH OF VIRGINIA
STATE WATER CONTROL BOARD
803 FRONT STREET
NORFOLK, VIRGINIA 23510

NOVEMBER 1980

TABLE OF CONTENTS

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of the Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation and analyses involving topographic mapping, subsurface investigations testing, and detailed computational evaluations are beyond the scope of a Phase I investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established guidelines, the spillway design flood is based on the estimated "Probable Maximum Flood" for the region (flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible), or fractions thereof. Becuase of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the design flood should not be interpreted as necessarily posing a highly inadequate condition. The design flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

PHASE I REPORT
NATIONAL DAM SAFETY PROGRAM

BRIEF ASSESSMENT OF DAM

Name of Dam:	College Lake Dam
State:	Virginia
Location:	City of Lynchburg
USGS Quad Sheet:	Lynchburg
Stream:	Blackwater Creek
Date of Inspection:	14 November 1980

The College Lake Dam is an earthen embankment about 300 feet long and 35.4 feet high. The dam is owned and maintained by the City of Lynchburg. The dam is classified as an intermediate size structure with a high hazard classification. The spillway is a deteriorated masonry weir across a rock cut located in the right abutment. This reservoir is used for recreation.

Based on criteria established by the Department of the Army, Office of the Chief of Engineers (OCE), the Spillway Design Flood (SDF) is the Probable Maximum Flood (PMF). The spillways will pass 10 percent of the PMF without overtopping the dam. Therefore the spillway is adjudged as inadequate but not seriously inadequate.

The visual inspection revealed no problems or remedial measures in need of immediate attention. There is no regular maintenance operation program or warning system, and it is recommended that a maintenance program and a warning system be established. The maintenance items listed in Section 7.2 should be accomplished as a part of the regular maintenance program within the next 12 months.

Submitted By:

Original signed by
JAMES A. WALSH

JAMES A. WALSH, P. E.
Chief, Design Branch

Approved:

Original signed by:
LTC Leonard C. Gregor

for DOUGLAS L. HALLER
Colonel Corps of Engineers
District Engineer

Recommended By

Original signed by
JACK G. STARR

JACK G. STARR
Chief, Engineering Division

Date: FEB 17 1981

CREST

SPILLWAY

OVERALL VIEWS COLLEGE LAKE DAM

14 NOVEMBER 1980

SECTION 1

PROJECT INFORMATION

1.1 GENERAL:

1.1.1 Authority: Public Law 92-367, 8 August 1972, authorized the Secretary of the Army, through the Corps of Engineers to initiate a national program of safety inspections of dams throughout the United States. The Norfolk District has been assigned the responsibility of supervising the inspection of dams in the Commonwealth of Virginia.

1.1.2 Purpose of Inspection: The purpose is to conduct a Phase I inspection according to the Recommended Guidelines for Safety Inspection of Dams (Reference 1, Appendix V). The main responsibility is to expeditiously identify those dams which may be a potential threat to human life or property.

1.2 Project Description:

1.2.1 Dam and Appurtenances: College Lake Dam is an earthfill embankment structure about 300 feet long and 35.4 feet high. The crest of the dam is 54 feet wide with a minimum crest elevation of 638.5 feet msl. U. S. Route 221 traverses the crest of the dam. The upstream slope of the dam is 2.25 horizontal to 1 vertical (2.25H:1V). Riprap is placed on the upstream face of the dam. The downstream slope is 1.25H:1V. Riprap is placed on the entire downstream face of the dam. The embankment has a clay core that is keyed into the foundation. Plan view and profiles are shown in Appendix I. It is not known if there is an internal foundation drain system.

The spillway is a deteriorated masonry wier across a rock cut through the right abutment with a width of 60 feet. A concrete arch bridge carrying Rt. 221 spans the spillway outlet channel.

1.2.2 Location: College Lake Dam is located on Blackwater Creek 0.1 miles northwest of Lynchburg College in the City of Lynchburg.

1.2.3 Size Classification: The dam is classified as an intermediate size structure because of impounding capacity.

1.2.4 Hazard Classification: The dam is located in an urban area with several occupied homes immediately downstream on Rt. 291; therefore, a high hazard classification is given for this structure according to guidelines contained in Section 2.1.2 of Reference 1, Appendix V. The hazard classification used to categorize a dam is a function of location only and has nothing to do with its stability or probability of failure.

1.2.5 Ownership: City of Lynchburg, Virginia. See Appendix IV, Pertinent Correspondence.

1.2.6 Purpose: Recreation.

1.2.7 Design and Construction History: The dam was designed by the Highway Department and constructed in 1934. The contractor is unknown.

1.2.8 Normal Operational Procedures: The operation of the dam is automatic. The spillway is ungated; therefore, water rising above the crest of the spillway automatically passed downstream.

1.3 Pertinent Data:

1.3.1 Drainage Area: The dam controls a drainage area of 22.3 square miles.

1.3.2 Discharge at Dam Site: The maximum flood is unknown.

Pool level at top of dam

Spillway . . . . . 5,000 cfs

1.3.3 Dam and Reservoir Data: Pertinent data on the dam and reservoir are shown in the following table:

TABLE 1.1 DAM AND RESERVOIR DATA

Item	Elevation feet msl	Reservoir Capacity Area, acres	Acre, feet	Watershed, inches 1/	Length feet
Top of Dam	638.5	120	1000	.00002	2.5
Spillway Crest	628.9	19.3	248	.000005	.7
Streambed at Downstream Toe of Dam	603.1	--	--	--	--

SECTION 2

ENGINEERING DATA

2.1 Design: Design drawings were obtained from the Virginia Department of Highways and Transportation. The drawings provide plans, elevations, sections, and details of the embankment and appurtenant structures.

Boring logs showing the type of foundation material were not available. The drawings show anti-seep collars along the low level outlet structure.

2.2 Construction: No construction records were available.

2.3 Evaluations: Based on the available information, an adequate representation of the dam geometrics can be assumed. However, there is no construction information. Therefore, there is insufficient information to evaluate the embankment stability.

SECTION 3

VISUAL INSPECTION

3.1 Findings:

3.1.1 General: The results of the 14 November 1980 inspection are recorded in Appendix III. At the time of the inspection, the weather was partly cloudy and cool. The temperature was 50°F. and the ground conditions were dry. The pool elevation was 628.9 feet msl and the tailwater was approximately 606.0+/-feet msl. It is not known if there have been any previous inspections of this dam.

3.1.2 Embankment: The embankment is in good condition. A plan view and cross section are shown on drawings provided in Appendix I.

There are no signs of surface cracks, unusual movement, sloughing, or misalignment. However, there is a bench on the upstream face which is apparently the result of riprap failure and wave action. There are numerous animal burrows near the left abutment on the downstream face.

The entire downstream face is covered by riprap of miscellaneous size, averaging 2 to 3 feet in diameter with some considerably larger.

The dam is covered with dense ground cover on the upstream and downstream face. Both faces also have small deciduous trees 2 to 6 inches in diameter growing on them. The upstream face has a few deciduous trees of larger diameter growing on it with a maximum diameter of about 2 feet. Several large deciduous trees are also growing at the toe of the downstream face with diameters as large as 3 feet.

3.1.3 Spillway: The spillway consists of a deteriorated masonry weir across an open rock cut through the right abutment. The approach channel to this is clear with the exception of vegetation and brush on each side of the channel. There is a concrete arch bridge carrying U. S. Rt. 221 spanning the outlet channel of the spillway. Also there is a 24-inch and an 15-inch ductile iron sewer line passing through the opening under the bridge on the right side in the outlet channel. The bed of the outlet channel is a sound outcrop of metamorphic rock.

A weir was constructed in the spillway in 1939 to raise the pool level of the reservoir to elevation 633.0. Based on verbal conversations of long time City of Lynchburg employees, this weir was removed to accommodate the construction of sewer lines through the spillway and was not replaced after the sewer lines were constructed.

3.1.4 Low Level Outlet: A 3-by-3-foot box culvert passes through the dam at a low level. The outlet was submerged by the tailwater and there was a noticeable flow coming from it. There is a 3-by-3-foot sluice gate near the center of the box culvert and it is controlled by a gate stem located on the crest on the south side of Rt. 221. The wheel was missing but it has been documented by the City of Lynchburg that it was last operated in 1970 by the City Fire Department (See Appendix IV).

3.1.5 Instrumentation: There is a U. S. Geological Survey bench mark located at the northeast corner of the bridge spanning the outlet channel.

3.1.6 Reservoir Area: The reservoir area was well vegetated with moderately steep slopes. The watershed is highly urbanized. There were no signs of slope failures along the shore line.

3.1.7 Downstream Channel: The downstream channel is clear of obstructions except for a 24-inch sewer line which crosses the channel at a high level above the stream. The banks are heavily wooded and moderately to mildly sloped. The downstream area is highly urbanized. There is a bridge carrying Rt. 291 crossing Blackwater Creek approximately .3 miles downstream. There are several occupied homes at this location.

3.2 Evaluation: Overall the dam appears to be in good condition. The inspection revealed certain preventive maintenance items which should be scheduled as a part of the annual maintenance program. These are:

a. The animal burrows should be dressed with compacted fill and seeded.

b. Place compacted fill in the area of the face eroded by wave action, reseed, and protect with riprap at the wave line area.

c. Remove the brush and cut all trees. All trees greater than three inches in diameter should have their root structure and root ball removed. The subsequent holes should be filled with well compacted earth and seeded.

d. Locate the wheel to the sluice gate stem and determine if the gate works. If it is not operable, make the necessary repairs to make it functional.

SECTION 4

OPERATIONAL PROCEDURES

4.1 Procedures: The normal storage pool elevation is 628.9 feet msl, which is the crest of a masonry weir located across a rock cut through the right abutment. Water passes automatically over the spillway as the water level in the reservoir rises above the weir crest. A 3-by-3-foot box culvert passes through the dam at a low level and is provided to lower the reservoir below normal pool. The gate is operated with a gate stem located on the upstream crest near the center of the dam. The valve wheel is missing.

4.2 Maintenance: There is no formal maintenance program for College Lake Dam.

4.3 Warning System: At this time, there is no warning system or evacuation plan for College Lake Dam.

4.4 Evaluation: The dam does not require an elaborate operation and maintenance program. However, the program should be initiated to help detect and correct problems as they occur. An emergency operation and warning plan should be developed. It is recommended that formal emergency procedures be prepared and furnished to responsible persons of the Virginia Department of Highways and Transportation and the City of Lynchburg. This should include:

a. How to operate the dam during an emergency.

b. Who to notify in case evacuation from the downstream area is necessary.

The local Emergency Services Coordinator can assist in the preparation of an emergency warning plan. The City of Lynchburg has indicated that it will prepare an emergency warning plan, with the assistance of the City's Civil Defense Emergency Service Coodinator in the very near future (See Appendix IV).

SECTION 5

HYDRAULIC/HYDROLOGIC DATA

5.1 Design: None were available.

5.2 Hydrologic Records: None were available.

5.3 Flood Experience: Unknown.

5.4 Flood Potential: The 1/2 PMF and PMF were developed by use of the HEC-1 computer program (Reference 2, Appendix V) and routed through the reservoir by use of the NWS-Dambreak computer program (Reference 3, Appendix V). Clark's Tc and R coefficients for the local drainage area were estimated from basin characteristics. The appropriate rainfalls applied to the developed unit hydrograph were obtained from the National Weather Service publications (Reference 4 and 5, Appendix V).

5.5 Reservoir Regulation: Pertinent dam and reservoir data are shown in Table 1.1.

Water passes automatically through the spillway as water rises above the spillway crest.

The storage curve was developed based on areas obtained from a U. S. Geological Survey Quadrangle Map. A rating curve was developed for the spillway. In routing hydrographs through the reservoir, it was assumed that the initial pool level was 628.9 feet msl.

5.6 Overtopping Potential: The probable rise in the reservoir and other pertinent information on reservoir performance is shown in the following table:

Table 5.1 RESERVOIR PERFORMANCE

Item	Normal Flow	Hydrograph 1/2 PMF	Hydrograph PMF 1/
Peak flow c.f.s.			
Inflow	22	25411	50821
Outflow	22	25118	50367
Maximum elevation ft. msl	628.9	645.0	649.4
Spillway Section (el. 628.9 feet, msl)			
Depth of Flow, feet	--	16.1	20.5
Velocity, fps 2/	--	18.6	21.0
Duration, hours	--	48.0	48.0
Non-overflow section (min. el 638.5 ft.msl.)			
Depth of flow, feet	--	6.5	10.9
Duration, hours	--	12.3	16.5
Velocity, fps 2/	--	11.8	15.3
Tailwater elevation feet, msl	606.0 +/-	--	--

1/ The PMF is an estimate of flood discharges that may be expected from the most severe combination of critical meteorologic and hydrologic conditions that are reasonably possible in the region.

2/ Critical Velocity

5.7 Reservoir Emptying Potential: A 3-by-3-foot sluice gate located near the center of the dam in the 3-by-3-foot low level outlet is available for dewatering the reservoir. The outlet will permit withdrawal of about 137 cfs with the reservoir at normal pool and essentially dewater the reservoir in less than 1.5 days. This is equivalent to an approximate drawdown rate of 17 feet per day based on the hydraulic height measured from normal pool divided by the time to dewater the reservoir.

5.8 Evaluation: Based on the size (intermediate) and hazard classification (high), the recommended Spillway Design Flood is the PMF. The spillway will pass 10 percent of the PMF without overtopping the dam. The PMF will overtop the dam by 10.9 feet with a peak critical velocity of 15.3 feet per second and flow over the dam for a total of 16.5 hours. Conclusions pertinent to present day conditions. The effect of future development on the hydrology has not been considered.

SECTION 6

DAM STABILITY

6.1 Foundation and Abutments: The plans prepared by the Virginia Department of Highways for this dam specify some general requirements for the foundation. These call for a clay core wall of the "most impervious material. The bottom to go to approved foundation at no place less than 6' under existing ground. The core wall is to be 10' wide and extend 3' above the pool elevation of 630.0'." Bridge specifications require that "all footings shall rest on solid rock. All foundations shall be approved by the Engineer. Care shall be taken to place fill symmetrically and evenly over whole area of bridge and wings."

The site lies near the western limit of the Piedmont physiographic province, and is underlain by the Lynchburg formation of late Precambrian age. The Lynchburg formation is characterized by gray biotite-quartz gneiss, quartz-mica schist, and graphitic schist, with sill-like bodies of amphibolite and hornblende gneiss in some areas. There are numerous outcrops of rock in the vicinity of the dam, particularly along the slopes near the right abutment and in the spillway channel and streambed beyond. This material should provide a stable and relatively impervious foundation for the dam. There is no foundation drainage system for this dam.

6.2 Embankment:

6.2.1 Material: The plans indicate that the embankment was to be constructed of "earth and broken stone, firmly compacted, coarse material to outside of fill; finer material to the center, rock from excavation worked to outside of fill and roughly placed as riprap to protect face of slope." The plans call for the clay core wall "to be built at same time rock and earth fill is put in dam; compacting of earth to be satisfactory to Engineer, each layer to be inspected by Engineer prior to placing next layer." The material used is from the vicinity of the dam, "secured from cuts at approximately Station 7 plus 00 or Station 25 plus 00 or suitable Borrow Pits within radius of 1500' from causeway as directed by Engineer." Area soils at the dam site appear to be residual silts or sandy silts.

6.2.2 Stability: There are no available stability calculations. The dam is 35.4 feet high and has a crest width of 54 feet. A paved highway traverses the crest of the dam. The upstream slope is 2.25H:1V and the downstream slope is 1.25H:1V. At the time of the inspection the impoundment was at normal pool (water at the level of the spillway), which for this dam is the same as maximum control storage pool. The dam has experienced a pool level at the top of the dam with water partially covering the highway with no apparent side effects. The dam would be subject to a sudden drawdown condition of approximately 17 feet per day if the low level outlet was fully open.

According to the guidelines presented in Design of Small Dams, U. S. Department of the Interior, Bureau of Reclamation, for small zoned dams with a stable foundation, the recommended slopes are 2H:1V upstream and 2H:1V downstream. The recommended width is 17 feet. Based on these guidelines, the dam has an adequate upstream slope, and an inadequate downstream slope, with a crest width more than 3 times the recommended width.

6.3 Evaluation: There is insufficient information to adequately evaluate the stability of the dam. However, the visual inspection revealed no apparent instability. Based on the visual inspection, the foundation is considered sound. Based on the Bureau of Reclamation guidelines, the dam has an adequate upstream slope, an inadequate downstream slope, and a crest width more than three times the recommended width. The embankment is considered stable during normal pool operations due to its massive width despite the inadequate downstream slope. Also, the embankment is considered stable during maximum storage pool operations because it is the same as normal pool. The degree of overtopping during the PMF (to a depth of 10.9 feet flowing with a velocity of 15.3 fps; overtopped for a duration of 16.5 hours) is not a problem, in view of its massive width and the protection against erosion offered by the paved highway across the crest and the rubble masonry wall and riprap boulders on the downstream face. Smooth asphalt pavements are capable of withstanding mean velocities of up to 15 feet per second and well placed rubble can withstand velocities up to 13 feet per second. Stability calculations are not required, because of past performance apparent by the visual inspection and the stabilizing effect of the massive width.

SECTION 7

ASSESSMENT/REMEDIAL MEASURES

7.1 Dam Assessment: The available engineering data is insufficient to adequately evaluate the stability of the embankment. The visual inspection revealed no findings that proved the dam to be unsound. There is no regular maintenance or inspection program and no emergency operation and warning plan. Overall, the dam is in good condtion. Corps guidelines indicate the appropriate Spillway Design Flood (SDF) for an intermediate size and high hazard dam is the PMF. The spillway will pass 10 percent of the PMF without overtopping the dam. Therefore, the spillway is adjudged as inadequate but not seriously inadequate. A stability check of the dam is not required.

7.2 Recommended Remedial Measures: It is recommended that a regular maintenance operations and inspection program be formalized for future reference. A formal emergency procedure should be prepared and furnished to all operating personnel. This should include how to operate the dam during an emergency, and who to notify, including public officials, in case evacuation from the downstream area is necessary.

The Highway Department and the City of Lynchburg should include enlarging the capacity of the spillway in any future improvement or expansion work planned for Rt. 221. Also, the inspection revealed the following maintenance items that should be scheduled during a regular maintenance period within 12 months:

a. All animal burrows should be dressed with compacted fill and seeded.

b. Place compacted fill in the area of the face eroded by wave action, reseed, and protect with riprap at the wave line area.

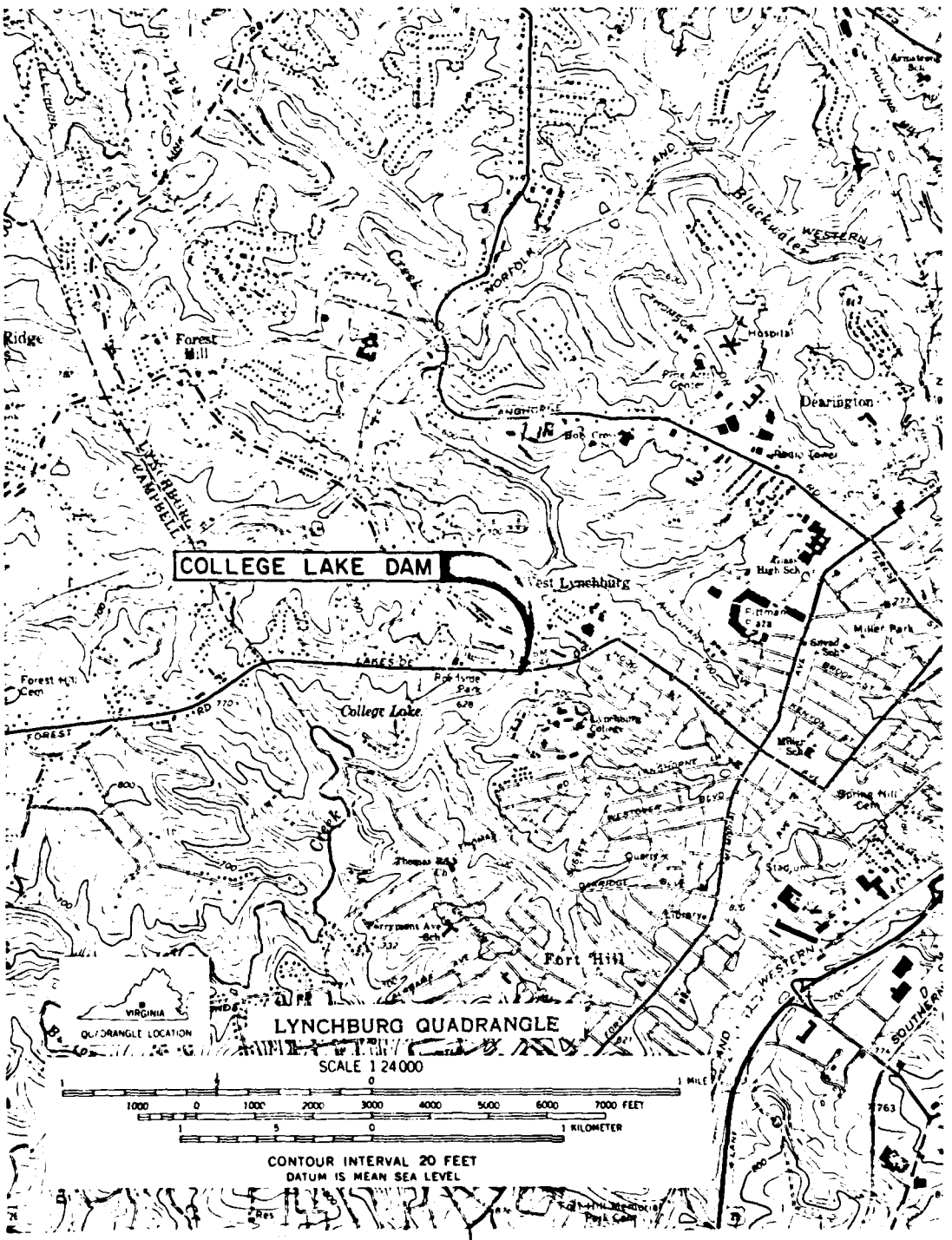
c. Remove the brush and cut all trees. Trees with diameters greater than three inches should have their root structures and root ball removed. The subsequent holes should be filled with well compacted earth and seeded. In areas where the trees are growing through the stone rubble, after removal, the rubble should be restored.

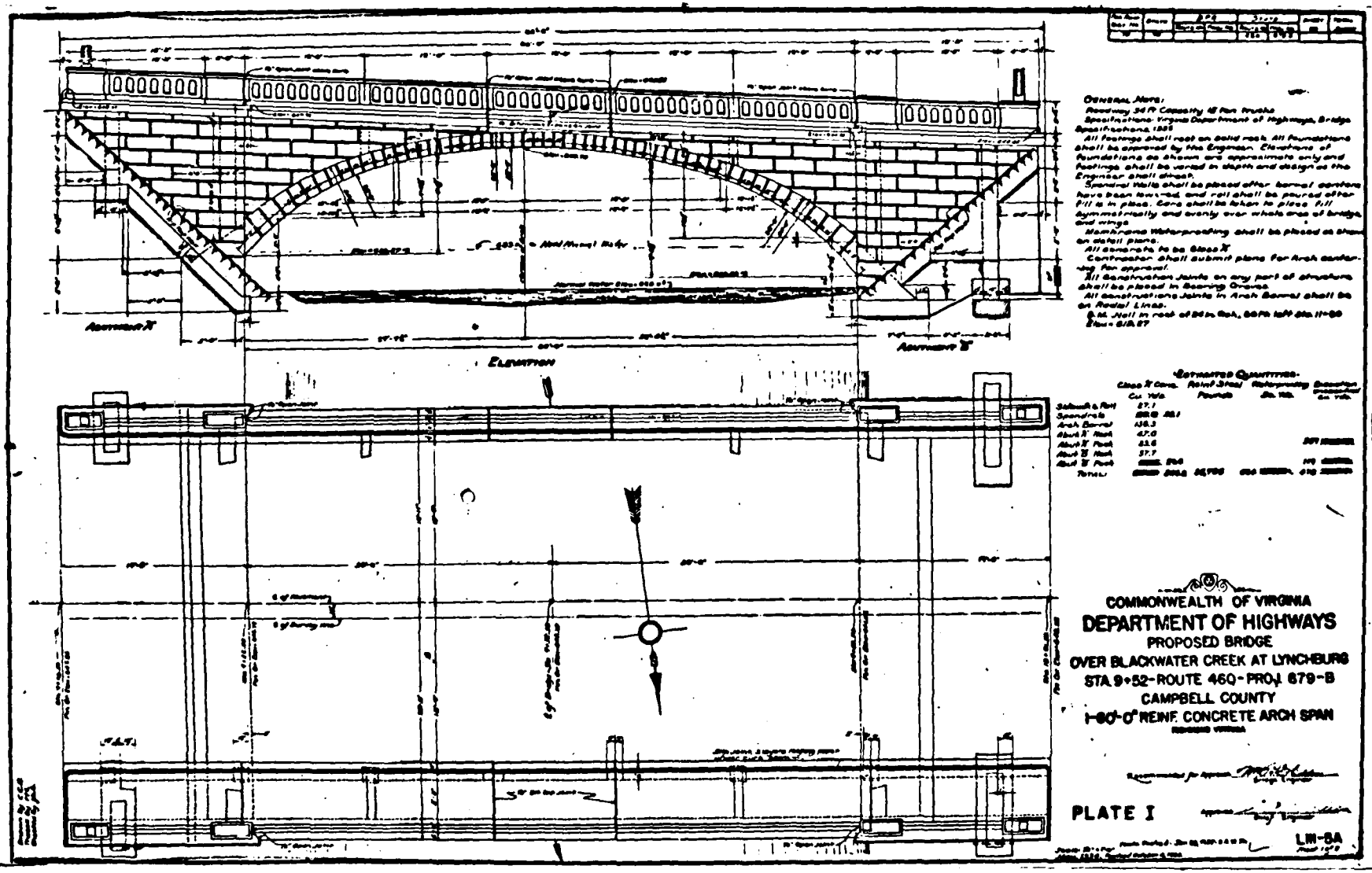
d. Locate the wheel to the sluice gate stem and determine if the gate works. If it is not operable, make the necessary repairs to make it functional.

e. Install a staff gage, which is a staff, rod, or post with elevations indicated on it permanently mounted in a lake to show the depth of the water. It should be of sufficient height to indicate the depth of flow through the spillway.

APPENDIX I

MAPS AND DRAWINGS


COLLEGE LAKE DAM
College Lake
Forest Hill
Fort Hill
Dearington
West Lynchburg
VIRGINIA
QUADRANGLE LOCATION
LYNCHBURG QUADRANGLE
SCALE 1 24000
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
CONTOUR INTERVAL 20 FEET
DATUM IS MEAN SEA LEVEL



COMMONWEALTH OF VIRGINIA

DEPARTMENT OF HIGHWAYS

PROPOSED BRIDGE

OVER BLACKWATER CREEK AT LYNCHBURG

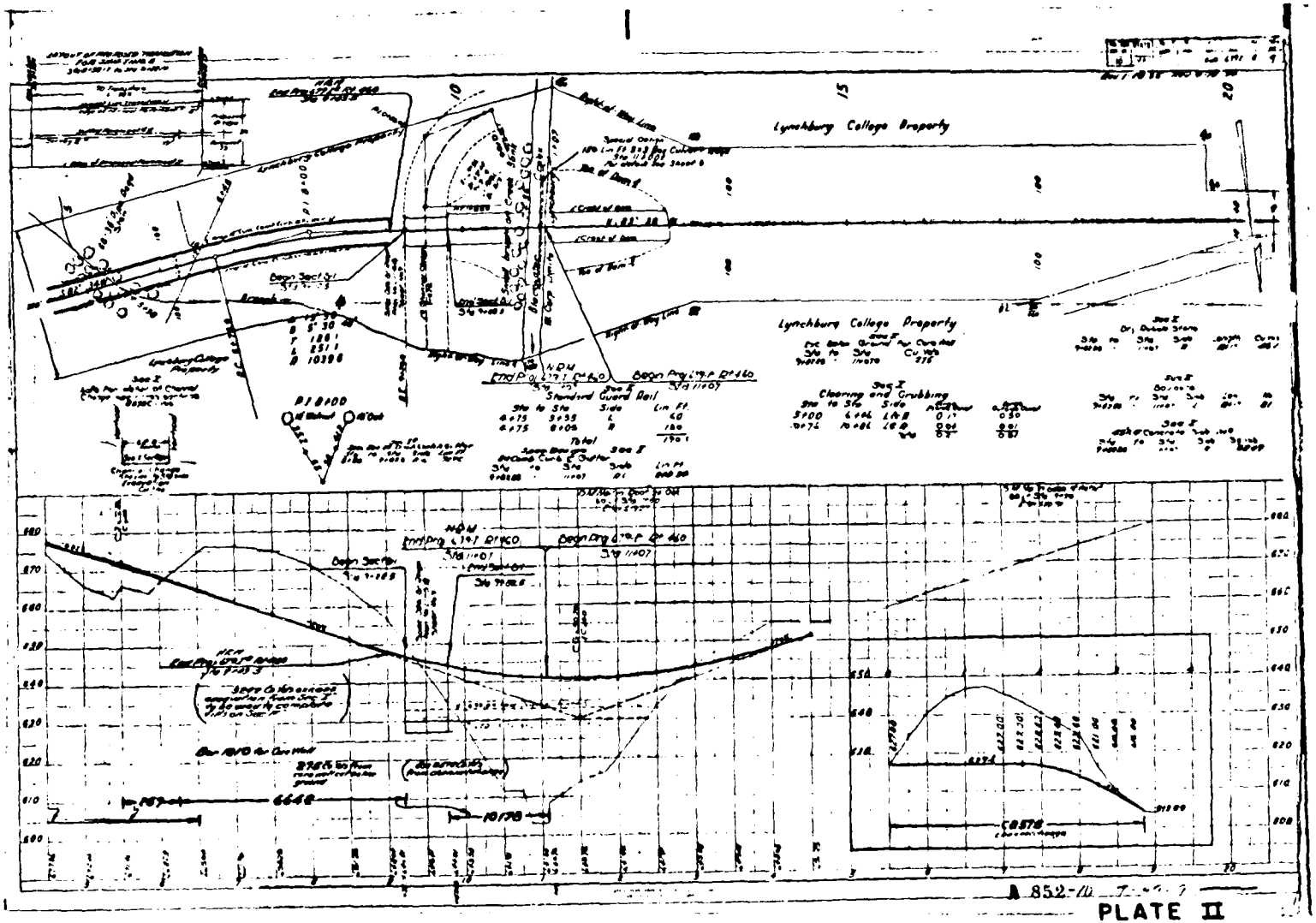
STA. 9+52 - ROUTE 460 - PROJ. 679-B

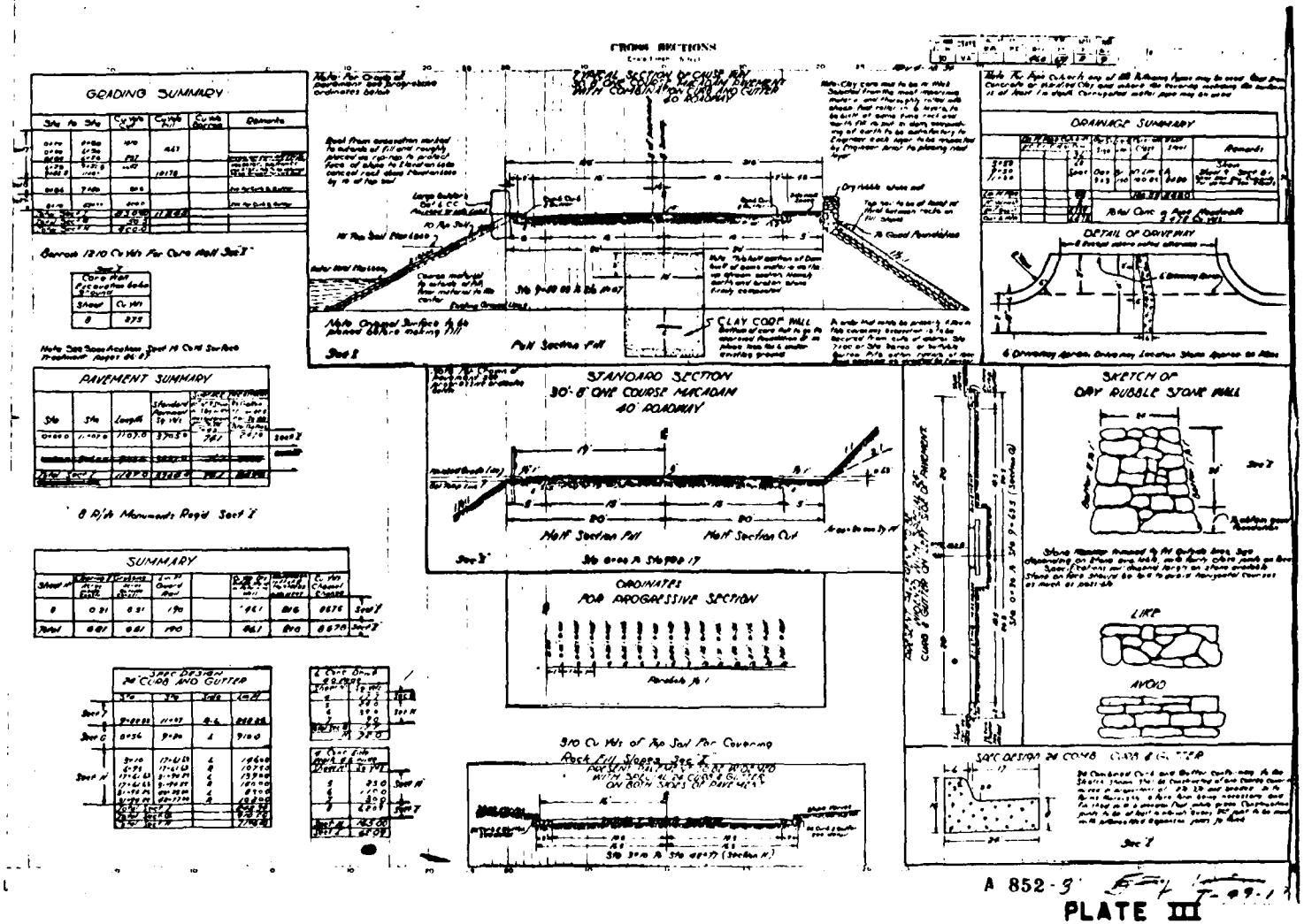
CAMPBELL COUNTY

1-60'-0" REINF. CONCRETE ARCH SPAN

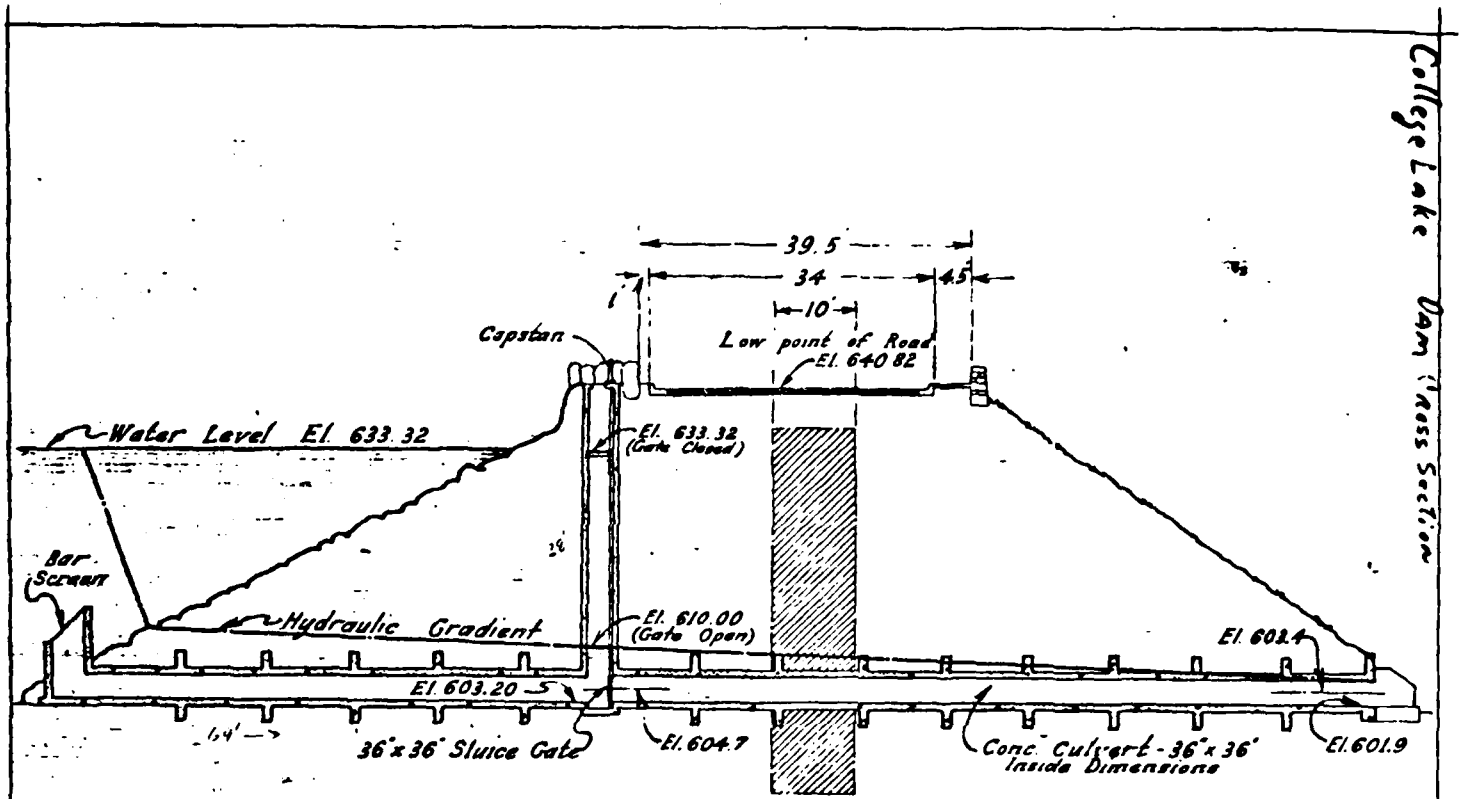
PLATE I

LM-8A


Lynchburg College Property
Lynchburg College Property
Lynchburg College Property
Standard Guard Rail
Clearing and Grubbing
PLATE II


CROSS SECTIONS
GRADING SUMMARY
DRAINAGE SUMMARY
PAVEMENT SUMMARY
SUMMARY
DETAIL OF DRIVEWAY
STANDARD SECTION
30'-8" ONE COURSE MACADAM
40' ROADWAY
Half Section Fill
Half Section Cut
SKETCH OF
DRY RUBBLE STONE WALL
LIKE
AVOID
ORDINATES
FOR PROGRESSIVE SECTION
Rock Fill Slopes
A 852-9
PLATE III

College Lake Dam Cross Section

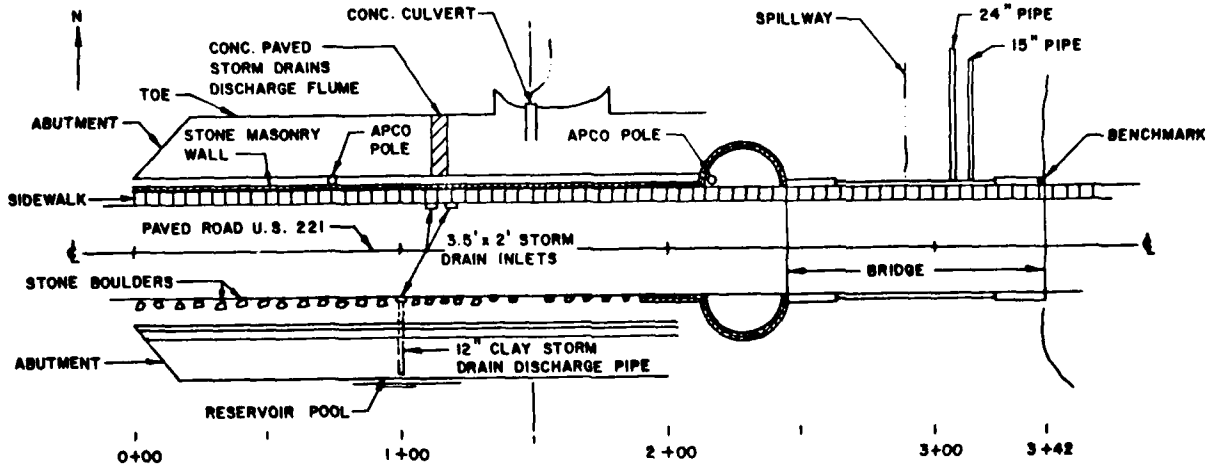


X-SECTION OF DAM AT LYNCHBURG COLLEGE LAKE
SHOWING DISCHARGE CULVERT.
Lynchburg, Va

Scale 1/16" = 1'-0"

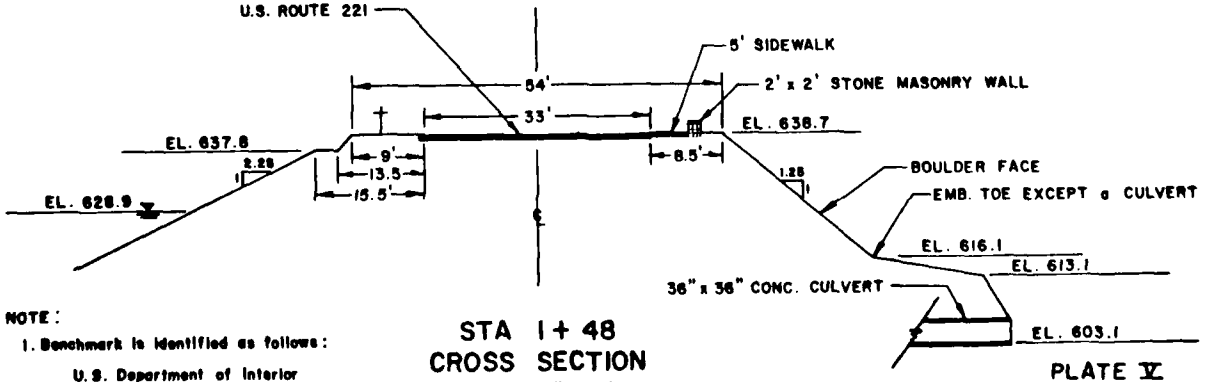
PLATE IV

June 2, 1938



PLAN VIEW

SCALE 1" = 50'



NOTE:

1. Benchmark is identified as follows:

U.S. Department of Interior
Elev. 646 Ft.
17 RAK 1962

STA 1+48
CROSS SECTION

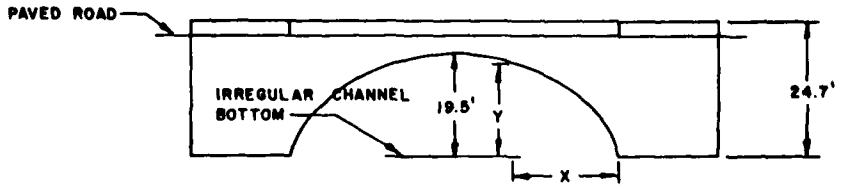
SCALE 1" = 20'

PLATE IX

LYNCHBURG COLLEGE LAKE

LYNCHBURG, VA

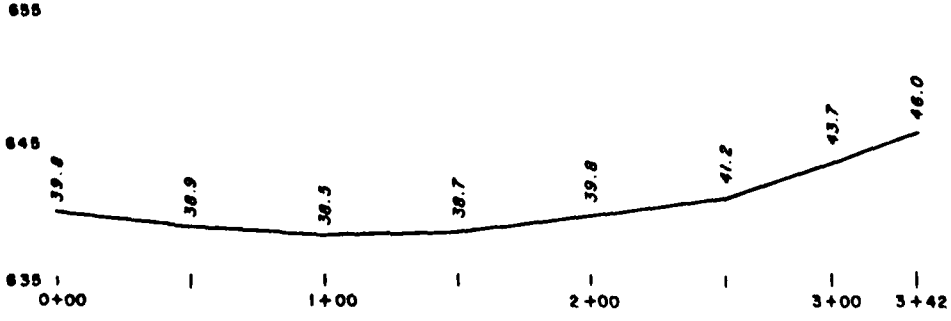
14 NOV 80



X	Y
12.0	13.7
21.6	16.3
33.4	17.0
42.0	15.0
52.0	10.0

BRIDGE PROFILE (LOOKING DOWNSTREAM)

SCALE 1" = 25'



CREST PROFILE

SCALE : H 1" = 50'
V 1" = 5'

PLATE VI

LYNCHBURG COLLEGE LAKE

LYNCHBURG, VA

14 NOV 80

APPENDIX II

PHOTOGRAPHS

PHOTO #1 CREST OF DAM

PHOTO #2 DOWNSTREAM FACE

PHOTO #3 TYPICAL OF STONE FACING ON DOWNSTREAM EMBANKMENT

PHOTO #4 THE SPILLWAY

PHOTO #5 RESERVOIR AREA & STONE REMNANTS OF PREVIOUS EFFORTS TO RAISE POOL LEVEL

PHOTO #6 AREA DOWNSTREAM OF SPILLWAY DISCHARGE CHANNEL

APPENDIX III

FIELD OBSERVATIONS

Check List
Visual Inspection
Phase I

Name Dam: College Lake City: Lynchburg State: Virginia Coordinates: Lat. 37-24.1
Long. 079-11.1

Date of Inspection: 14 Nov 80 Weather: Partly Cloudy Temperature: 50° F.

Pool Elevation at Time of Inspection: 628.9ft. msl. Tailwater at Time of Inspection: 606 ft. msl +

Inspection Personnel:

B. Taran, COE	Joe Miller, COE	Dave Bushman, SWCB	Kirk Murphy, Lynchburg College
J. Robinson, COE	Len Jones, COE	Hugh Gildea, SWCB	
D. Pezza, COE			

Bushman Recorder

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SURFACE CRACKS	None Observed.	None
UNUSUAL MOVEMENT OR CRACKING AT OR BEYOND THE TOE	None Observed.	None
SLOUGHING OR EROSION OF EMBANKMENT AND ABUTMENT SLOPES	Wave erosion on upstream face. Numerous animal burrows in left abutment on downstream face.	Repair erosion and place riprap on upstream face to prevent further erosion. Fill animal burrows with compacted fill and reseed.
VERTICAL AND HORIZONTAL ALIGNMENT OF THE CREST	Appears to be good. Asphalt pavement of roadway was in good condition.	None
RIPRAP FAILURES	The riprap on the upstream face has failed.	New riprap should be placed on the upstream face.
FOUNDATION	Appeared to be founded on stable impervious rocks. There were no signs of settlement or sliding.	None

EMBANKMENT

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
ANY NOTICEABLE SEEPAGE	None Observed.	None
DRAINS	None Observed.	None
MATERIALS	Construction materials consist of a clay core wall, with the rest of the embankmemt composed of earth and stone fragments. All materials were obtained from local borrow sources.	None
VEGETATION	The dam was heavily overgrown with trees and brush. There were several large deciduous trees of 2' diameter or larger growing near the toe of the embankment and on the upstream face.	Remove brush and cut all trees. Subsequent holes to be filled with well compacted earth and seeded. In rubble areas, the rubble is to be restored upon removal of trees and root structures.

SPILLWAY

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONTROL SECTIONS	Consist of a deteriorated masonry wier with a 60' width.	None
APPROACH CHANNEL	It is clear with the exception of some brush on either side.	Remove the brush.
DISCHARGE CHANNEL	This was clear of obstructions and steeply sloped with the exception of a concrete arch bridge carrying rt. 221 which spans the channel. A 24" and a 15" ductile iron pipe pass through the opening made by the bridge as it crosses the channel. They are city sewer lines. The bed was sound rock.	None
BRIDGE AND PIERS	The bridge appeared to be in excellent condition. The concrete showed no signs of spalling or deterioration.	None
DRAIN STRUCTURE	Tailwater has submerged the drain outlet. There is a noticable amount of flow coming from the outlet. The gate control stem is located near the center of the dam on the south side of rt. 221. The wheel is missing and its location is unknown.	Locate the wheel and determine if the gate is operable. If it is not operable, make the necessary repairs to make it functional.

INSTRUMENTATION

VISUAL EXAMINATION OF	OBSERVATIONS	*REMARKS OR RECOMMENDATION*
MONUMENTATION/SURVEYS	There is a USGS benchmark in the N.E. corner of the bridge over the spillway outlet channel.	None
OBSERVATION WELLS	None Observed.	None
WEIRS	None Observed.	*None*
PIEZOMETERS	None Observed.	None
STAFFGAGES	None Observed.	*A staffgage should be installed to monitor reservoir level.*
OTHER		

RESERVOIR

VISUAL EXAMINATION	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
SLOPES	Well vegetated moderately steep slopes. The watershed is urban in nature. There were no signs of slope failure or shoreline erosion.	None
SEDIMENTATION	Not evaluated.	None

DOWNSTREAM CHANNEL

VISUAL EXAMINATION OF	OBSERVATIONS	REMARKS OR RECOMMENDATIONS
CONDITION (OBSTRUCTIONS, DEBRIS, ETC.)	The channel was clear of obstructions except for a 24" sewer line which crosses the channel at a high level. The banks were heavily wooded.	None
SLOPES	Moderately steep to mild and heavily wooded.	None
APPROXIMATE NO. OF HOMES AND POPULATION	The downstream area is heavily urbanized and several homes are located immediately downstream along rt. 291.	None

APPENDIX IV

PERTINENT CORRESPONDENCE

COMMONWEALTH of VIRGINIA
DEPARTMENT OF HIGHWAYS & TRANSPORTATION
1221 EAST BROAD STREET
RICHMOND, 23219

D. H. GAULDEN, JR.
DISTRICT ENGINEER

Please Reply To
Department of Highways
and Transportation
Lynchburg, Virginia

January 28, 1981

College Lake Dam
Inventory No. 68002

Mr. R. V. Davis, Executive Secretary
State Water Control Board
P. O. Box 11143
Richmond, Virginia 23230

Dear Mr. Davis:

In response to your letter to me of January 23, 1981, with attachment, this is to confirm my review of same.

This facility is under the jurisdiction of the City o Lynchburg, and it is my recommendation that the City establish and maintain a formal inspection program to carry out the remedial measures set forth in Section 7 of the Phase I Inspection Report, with future findings and related remedial measures being documented in accordance with governing statutes.

Yours very truly,

D. H. Gaulden, Jr.
District Engineer

DHG:jr
Cy - Mr. Fred Fisher
Cy - Mr. C. W. Maus
Cy - Mr. J. G. Starr
Cy - Mr. Raymond A. Booth
Cy - Mr. J. G. Ripley
Cy - Mr. T. E. Pittman

Attachments
BWCM
Cover ltr

The City of Lynchburg, Virginia
CITY HALL, LYNCHBURG, VIRGINIA 24505

DEPARTMENT OF
PUBLIC WORKS

February 5, 1981

Mr. R. V. Davis
Acting Executive Secretary
State Water Control Board
Post Office Box 11143
Richmond, Virginia 23230

Dear Mr. Davis:

Re: College Lake Dam
Inventory No. 68002

Reference is made to your letter dated January 23, 1981, in which you requested the City of Lynchburg's comments on the preliminary report for the College Lake Dam. We appreciate the opportunity to review this report and offer our comments.

Section 1.2.5 Ownership: As a result of the City's agreements with the Virginia Department of Highways and Transportation, the City of Lynchburg assumed complete ownership of the highway and related dam and facilities. However, on August 31, 1966, the City of Lynchburg vacated approximately 3.3 acres of land in this area and returned ownership of this land to Lynchburg College. We are attaching for your record copies of all documentation and maps for this vacation. This information is recorded in Deed Book 412, page 254, of the Lynchburg City Clerk's Office. While it is not clear as to how much of the dam is returned to Lynchburg College by mistake, we would feel that the maintenance items you mentioned in your report would probably still remain with the City.

Section 3.1.3 Spillway: There is a 24-inch and 15-inch sewer line passing through the opening under the bridge rather than the 30-inch and 18-inch noted in the report. With regard to the remains of the old weir located in the stream bed, our records indicate that this weir was constructed in 1939, a copy of the plans are attached, and raised the elevation of the lake to elevation 633.00. Based upon our conversations with long-

term City employees, this weir was removed to accommodate the construction of the sewer lines beneath the bridge and was not replaced after the sewer lines were constructed.

Section 3.1.4 Low Level Outlet: Based upon our conversations with long-term City employees, this sluice gate was operated around 1970 mistakenly by City firemen during a heavy rainstorm, and the opening of this sluice gate caused extensive damage to the property directly below the dam. As a result of this incident, the wheel was removed and stored somewhere on City property. Therefore, we feel the gate is operational and could be operated by placing a large wrench or wheel on this gate stem.

Section 3.1.7 Downstream Channel: The size of the sewer line in this paragraph should be 24 inches rather than 30 inches as noted.

Section 4.4 Evaluation: The City of Lynchburg's Civil Defense Emergency Services Coordinator has been contacted and will assist us in preparing the emergency warning plan by March 1, 1981.

For your information and file, we are also attaching copies of Drawings A-579A and A-579B which shows details of the manhole and capstan and wheel located on this sluice gate.

Again we appreciate the opportunity to respond to this report and also appreciate your granting us a time extension for replying. If you have any questions concerning the above comments, please advise.

Sincerely,

Raymond A. Booth, P.E.
Director of Public Works

RAB/rrw
Attachments
cc: William A. Anderson
Fire Chief

APPENDIX V

REFERENCES

APPENDIX V

REFERENCES

1. Recommended Guidelines for Safety Inspection of Dams, Office of the Chief of Engineers, Department of the Army, Washington, D. C.

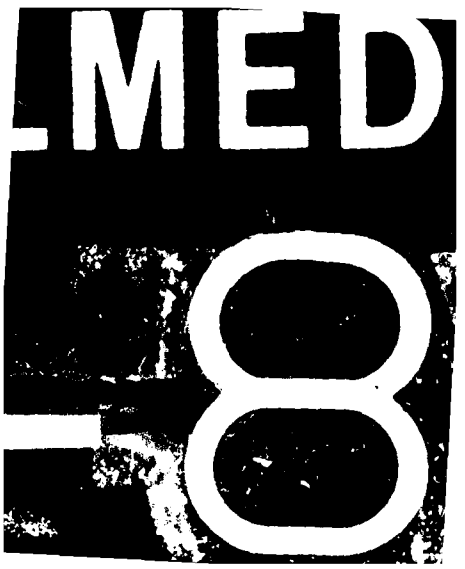
2. HEC-1 Flood Hydrograph Package, (Hydrologic Engineering Center, U. S. Army Corps of Engineers, January 1973)

3. NWS-Dambreak Computer Model, (Office of Hydrology, National Weather Service (NWS), Silver Spring, Maryland, September 1980)

4. "Probable Maximum Precipitation Estimates, United States East of the 105th Meridian, "Hydrometeorological Report No. 51, (National Weather Service, June 1978).

5. "Rainfall Frequency Atlas of the United States", Technical Paper No. 40, (National Weather Service, May 1961)

6. Bulletin 74: Geology and Mineral Resources of the Lynchburg Quadrangle, Virginia, William Randall Brown, (Virginia Division of Mineral Resources, 1958)


LMED
8